

WE CLAIM:

- 1 1. A wireless data communications system having extended power off capability
2 comprising:
3 (a) a first station linked to a second station which serves as an access point
4 (AP) to support packet communication, voice or data;
5 (b) monitoring apparatus at the access point (AP) which sorts packets
6 according to a Continuously Aware Mode (CAM) or Power Saving Model (PSM) mode; and
7 (c) measuring apparatus at the first station which receives the CAM packets
8 and measures CAM packet arrival time for determining a safe period for turning off the receiver
9 between CAM packets based upon an expected arrival time of the CAM packets.
- 1 2. The system of Claim 1 further comprising:
2 (d) transmitting apparatus which transmits immediately CAM packets to the first
3 station while non-voice packets are buffered by the access point (AP) and held until requested by
4 the first station when in a Power Saving Poll (PSP) mode.
- 1 3. The system of Claim 1 wherein the measuring apparatus further comprises:
2 (e) “jitter” measuring apparatus which measure “jitter” associated with packet arrival
3 intervals.
- 1 4. The system of Claim 1 further comprising:
2 (f) “sleep” apparatus responsive to the measuring apparatus which awakens the first
3 station for receiving packets based upon the safe period.

1 5. The system of Claim 1 wherein the access point and the first mobile unit operate under
2 the IEEE 802.11 standard.

1 6. The system of Claim 1 further comprising:

2 (g) first station comparing apparatus which compares the ith actual packet arrival
3 time [A (i)] to expected packet arrival time (P).

1 7. The system of Claim 6 further comprising:

2 (h) first station determining apparatus which determines the state of the PSP mode as
3 "0" or disable or "1", enabled but in trouble, or "2", enabled.

1 8. The system of Claim 7 further comprising:

2 (i) first station processing apparatus which operates when AI (i) does not approach P
3 and waits for the next packet if the PSP state is 0 or waits for the next packet if the PSP mode is
4 "1" with no good packet intervals and reduces the "Power Off" time by a slight amount when the
5 PSP mode is 2 or enabled.

1 9. The system of Claim 8 further comprising:

2 (j) first station measuring apparatus which determines an extended "Power Off" time
3 between packets as [P-Standard Deviation of Consecutive Packet Arrival Time AI (i, i+1, i+2) –
4 Receiver Stabilizing Time after "Power On"] when in the "0" mode and AI (i) approaches P or if
5 the PSP mode is "1" or "2" waiting for the arrival of the next packet whereupon the "Power Off"

6 mode is extended beyond normal "Power Off" time due to the periodic nature of the voice
7 traffic.

1 10. A method for extended "Power Off" period for a wireless communication system
2 comprising:

3 (a) waiting for packet arrival at a mobile unit in the wireless communication system;

4 (b) comparing actual packet time {AI(i)} versus P or expected packet arrival time;

5 (c) determining the status of a PSP mode as "0" or enabled; "1" or in trouble, or "2"
6 enable;

7 (d) returning to Step b, if AI (i) does not approach P and the PSP mode is 0 or 1, and
8 reducing the Power Off time, if the PSP mode is 2;

9 (e) determining the PSP mode if AI (I) approximates P;

10 (f) returning to Step a, if the PSP mode is 1 or 2; and

11 (g) calculating an extended Power Off time.

1 11. The method of Claim 10 further comprising the step of:

2 (i) reducing the "Power Off" time by a slight amount when the PSP mode is 2 or
3 enabled when AI (i) does not approach P and waits for the next packet if the PSP state is 0 or
4 waits for the next packet if the PSP mode is "1" with no good packet intervals.

1 12. The method of Claim 11 further comprising the step of:

2 (h) waiting for the arrival of the next packet AI (i) which approaches P or if the PSP
3 mode is "1" or "2".

1 13. The method of Claim 12 wherein the actual packet arrival time $[AI(i)] = \text{Current Arrival}$
2 Time (CT) – Last Packet Arrival Time (LT) and $LT=CT$.

1 14. The method of Claim 13 wherein the extended Power Off Time is $[P - \text{Standard Deviation}$
2 $(AI(i), AI(i-1), AI(i-2) - \text{Receiver Start Up Time (RSU)})]$ when the PSP is 0, whereby an
3 extended Power Off time is achieved by the periodic nature of the packet arriva time.

1 15. A medium, executable in a computer system, for extended “Power Off” period for a
2 wireless communication system comprising:

3 (a) program instruction for waiting for packet arrival at a mobile unit in the wireless
4 communication system ;

5 (b) program instruction for comparing actual packet time $\{AI(i)\}$ versus P or
6 expected packet arrival time;

7 (c) program instruction for determining the status of a PSP mode as “0” or enabled;
8 “1” or in trouble, or “2” enable;

9 (d) program instruction for returning to Step b, if AI (i) does not approach P and the
10 PSP mode is 0 or 1, and reducing the Power Off time, if the PSP mode is 2;

11 (e) program instruction for determining the PSP mode if AI (I) approximates P;

12 (f) program instruction for returning to Step a, if the PSP mode is 1 or 2; and

13 (g) program instruction for calculating an extended Power Off time.

1 16 The medium of Claim 15 further comprising the step of:
2 (h) program instruction for reducing the "Power Off" time by a slight amount when
3 the PSP mode is 2 or enabled when AI (i) does not approach P and waits for the next packet if
4 the PSP state is 0 or waits for the next packet if the PSP mode is "1" with no good packet
5 intervals.

1 17. The medium of Claim 16 further comprising the step of:
2 (i) program instruction for waiting for the arrival of the next packet AI (i) which
3 approaches P or if the PSP mode is "1" or "2"

1 18. The medium of Claim 17 wherein the actual packet arrival time $[AI(i)] = \text{Current Arrival}$
2 Time (CT) -- Last Packet Arrival Time (LT) and $LT = CT$.

1 19. The medium of Claim 18 wherein the extended Power Off Time is $[P - \text{Standard}$
2 Deviation (AI (i), AI (i-1), AI (i-2) – Receiver Start Up Time (RSU)] when the PSP is 0,
3 whereby an extended Power Off time is achieved by the periodic nature of the packet arrival
4 time.